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SOME DATA ON THE  
**POLAR BEAR**  
AND ITS UTILIZATION  
IN THE CANADIAN ARCTIC

by  
C.R. HARRINGTON

December, 1961

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CANADA Northern Affairs.  
National Parks Branch

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Some Data on the Polar Bear in the Canadian Arctic

CANADIAN WILDLIFE SERVICE

The following material has been prepared and submitted to the Canadian Wildlife Service, Department of Northern Affairs and National Resources, Ottawa, Ontario, for publication. It is based on the information received from the various field stations and the National Wildlife Service, and is intended to provide a general overview of the status of the polar bear in the Canadian Arctic.

SOME DATA ON THE POLAR BEAR

AND ITS UTILIZATION

IN THE CANADIAN ARCTIC

Although little is known of the life history of the polar bear, it is known that it is a highly adaptable animal. It is found in the Arctic region of Canada, and is known to be a highly intelligent animal. It is known to be a highly adaptable animal, and is known to be a highly intelligent animal. It is known to be a highly adaptable animal, and is known to be a highly intelligent animal.

By

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## Some Data on the Polar Bear and its Utilization in the Canadian Arctic

The following material has been organized and summarized from Fur Take and Game Take records in the files of the Territorial Division, Department of Northern Affairs and National Resources, and from Canadian Wildlife Service questionnaires completed with the co-operation of the Royal Canadian Mounted Police and the Hudson's Bay Company. The annual game reports from the Northwest Territories supplied by the former agency have proved particularly valuable in their mention of field conditions as they influence bear hunting and occurrence.

### Area

The region considered in this report is the Canadian Arctic, particularly those coastal strips of the Northwest Territories known to be the mutual habitat of white bears and Eskimos. Information in some detail has been gathered from 14 to 26 northern settlements.

Although little mention will be made of bear occurrence and utilization in northern Manitoba, Ontario, Quebec, and Newfoundland, it seems unlikely that a yearly maximum kill from these areas would total over 34 animals. Of this total perhaps no more than eight are taken from Manitoba, possibly an average of 12 each from Ontario and Quebec, and no more than two from Newfoundland.

### Objectives

It is hoped that the data gathered will provide some index of the numbers of bears taken in Northern Canada from 1921 to 1960, besides suggesting possible reasons for the resultant trends. Apart from reference to total known annual kills during the above period, general data will be presented regarding sex and age, organization of hunts, kill chronology, and utilization. These data must be accepted with due caution, however, as basic information was not always complete, nor were samples in questionnaire replies sufficiently large at all times. It must be remembered that in some cases, such as assessment of bear utilization by the Eskimos, information depends upon individual estimates, which vary in reliability from person to person according to his experience and interest in the Eskimo way of life. An attempt has been made to show the great rise in price of polar bear pelts since the 1890's,

and its impact on the Canadian kill. The importance of international co-operation in undertaking research on the polar bear, so that sound management practices can be formulated, has also been stressed.

#### Data

##### Known Kill

From fur export records dealing with the period 1921 to 1959, the general trend of minimum known take of polar bears may be outlined (Fig. 1). The number of exported pelts rose from 208 in 1921 to a peak of 391 in 1925. From that time, exports, and consequently the known bear take, decreased rather rapidly to 18 in 1934, the lowest recorded figure. A pronounced low in numbers of pelts exported existed from 1932 to 1937. Another less significant low, according to fur export data, occurred during the war period 1940-1946, which apparently did not result because of a drop in demand, but possibly because of a deflection of interest away from the North, and a trend to invest in the war effort and to purchase basic commodities rather than luxury items. After 1946 there was a marked general increase in the number of polar bear skins exported from the Northwest Territories until a second, higher peak of 525 was reached in 1958. It seems reasonable to associate such a curve with the state of the Canadian economy during the 1921-1959 period. In fact, there appears to be a positive correlation between the national income of Canada and both number of polar bear pelts exported and fur production values for the above period (Fig. 1). Thus it is very likely that the low in bear skins exported from 1932 to 1937 was governed by the unhealthy state of the Canadian and world economy during the early 1930's. The great rise in Canadian national income and gross national product following the Second World War is paralleled by a rise in bear pelts exported. Great reservations must be held for any more detailed analysis of this nature. By 1960 it seems that the summit of the second major peak had been reached, but this is subject to doubt.

Other factors influencing the fur export curve must also be heeded, such as recent increase of population in the Arctic and the high income of many northern wage-earners. Those factors have probably contributed greatly to the record height of the 1958 peak. A slow, but steady rise in the Eskimo population of Arctic Canada during the 1921-1959 period may also have brought about a rise in the bear kill and thus in furs available for export. Increased native wage employment may have offset

any tendency in this direction, however. The desire and effort of the Eskimos to hunt polar bears is probably essentially uniform over a long period, fluctuating mainly with outside economic demand, but this will be mentioned in more detail later. It is extremely doubtful that the curve in Fig. 1 indicates that the number of polar bears has oscillated greatly throughout Northern Canada, although basic information on the actual population of the region is unknown. It cannot be denied, however, that some bear seasons are "better" than others - on a regional level at least. Some factors contributing to higher survival and reproduction are suitable combinations of ice, open water, and land; adequate prey (mainly seals) and forage. Snow, wind, and topographical conditions are important where denning females are concerned and thus probably influence cub survival. Ecological and weather conditions also affect the hunting intensity of the Eskimos. Man is certainly the major predator of the polar bear, but it is not known to what extent he alters the total bear stock in Canada. The apparent ability of the bears to withstand the relatively high predation pressure in the past decade may mean that the breeding stock is not being depleted at the rate suggested by Fig. 1.

It has been deemed advisable to discuss annual kill data from only the most complete information at hand. This has been gathered from questionnaires covering the periods 1953-54 and 1956-57, and less substantial reports from 1957 to 1960. During the 1953-54 season, the kill according to fur export records amounted to at least 437 bears. If about 20 per cent of the skins taken were retained, which seems reasonable according to field estimates, then possibly as many as 546 bears were killed during the period (this total does not include all animals killed in the provinces). Some 323 bears were reported killed from 14 settlements sampled in Northern Canada. From data on known kills, the following areas seem to have been most productive: Southampton Island (95), Repulse Bay (56), Pangnirtung (50), and Clyde River (42).

In 1956-57, the most complete survey made, the kill according to fur export data amounted to 416 polar bears. Allowing for 20 per cent retention of skins by Eskimos, the possible total annual kill was 520 animals. The sampled kill from 23 areas in Northern Canada was 408 bears. Greatest known kills took place in the vicinities of Southampton Island (67), Pangnirtung (67), Simpson Peninsula (50), and Arctic Bay (49).

The highest kill derived from fur export returns occurred in 1957-58 when 525 pelts were recorded. A total actual kill of 655 may be a sound estimate for this period

in the Canadian Arctic. A sampled kill of some 384 bears was reported on from 24 settlement areas. From known data, the greatest kills were recorded near Frobisher Bay (61), Repulse Bay (56), Southamton Island (54), and Pangnirtung (54).

During the 1958-59 season, 382 bears could be considered a minimum kill in Arctic Canada, according to fur export tax information. Thus, allowing for a retention of 20 per cent of the skins taken, the total annual kill may have been about 478 bears. The sampled kill totalled 419, which was reported from 25 different settlement areas. The largest numbers of bears seem to have been taken near Southamton Island (63), Resolute Bay (58), Clyde River (51), and Spence Bay (47).

In 1959-60 the fur export records indicated a minimum kill of 509 polar bears, thus the total kill in the Canadian Arctic may have reached about 635. The sampled kill involved 452 bears from 26 northern settlements. Highest known kills were from the following areas: Resolute Bay (65), Clyde River (62), Southamton Island (46), Frobisher Bay (45).

Using the highest polar bear kills recorded from fur export, Royal Canadian Mounted Police, and Hudson's Bay Company sources over the five-year period (1956-1960), and ascertaining a yearly average, the following areas seem to be most productive: Southamton Island (66), Resolute Bay (49), Pangnirtung (43), Clyde River (42), Spence Bay (36), Arctic Bay (36), Frobisher Bay (32), Sachs Harbour (28). In a similar manner the marginal areas of white bear range may be indicated: Grise Fiord (14), Cambridge Bay (12), Ontario - north coast (12), Alexandra Fiord (6), Cape Dorset (4), Coppermine (2), Chesterfield Inlet (1).

Although the yearly take of polar bear pelts in the Canadian Arctic during the 1951-1960 period averaged 430 (based on fur export returns), allowing for 20 per cent retention of skins by Eskimo hunters it is likely that the total actual kill was of the order of 540 bears per year. In the five-year period 1956-1960, the total actual bear kill possibly averaged 563 animals yearly.

#### Sex and Age

Of the 323 bears in the 1953-54 sampled kill, 78 were classified according to sex (Table 1). The sex ratio of polar bear kills of known sex was about 86 males:100 females. Approximately 15 per cent of the bears aged were cubs (up to 2 years old).

In 1956-57, from a sampled kill of 408 bears from 23 areas in Northern Canada, about two-thirds were recorded as to sex. The sex ratio of bear kills of known sex was approximately 100 males:100 females. Some 22 per cent of the sampled kill during the period was composed of cubs. The extremely large take of cubs (75) in the Southampton Island area is worthy of note. This probably resulted from the concentration of bear hunting in the spring when the young emerged in an excellent denning territory. A similar condition occurred on Southampton Island in 1953-54 when about one-third of the reported take consisted of cubs. Present legislation prohibits killing of females and their cubs (see page 13).

During the 1957-58 period, the sex ratio of polar bear kills of known sex approximated 78 males:100 females. But it should be emphasized that a sex classification was provided from only four of the areas sampled, decreasing the value of the ratio greatly. Fourteen cubs were reported to have been killed during the period from a total of 84 bears, thus it is possible that they composed 17 per cent of the population.

The following season's (1958-59) sex ratio of bears of known sex in the kill was about 148 males:100 females, 156 bears having been sexed. Twelve cubs were reported taken from a total of 98 bears. Thus cubs at this time may have made up some 12 per cent of the bear population.

The sex ratio of the bear kills of known sex in 1959-60 was about 100 males:100 females - this calculation being based on 32 sexed animals from Resolute Bay and Pangnirtung only. No cubs were reported killed and no information on their percentage composition of the whole polar bear population can be provided. It is likely that at least a few cubs were taken, for this is difficult to avoid at times, but one can understand the reluctance of Eskimos to report such cases.

In summary, averaging the sex ratio of the kill during the above-mentioned periods, the resultant ratio is 102 males:100 females. The two most reliable ratios (1953-54 and 1956-57) average 93 males:100 females. From this rough evidence it appears that the natural sex ratio of polar bears in Northern Canada is approximately even - presuming that any sex selection practised by the Eskimos in hunting has been compensated or did not exist. But it should be mentioned that availability may override preference and can also be compensated. For example, it seems that mainly males are taken in the Clyde River area - females being largely absent during the peak hunting period,

whereas the opposite condition apparently holds in the vicinity of Southamton Island and on Simpson Peninsula. With respect to age composition of the polar bear population in the Canadian Arctic, a tentative average figure of 20 per cent cubs (up to 2 years) may approach reality. Averaging the given information yields an age composition of 18 per cent cubs; averaging percentages of the two most reliable periods provides a 21 per cent composition of cubs. Again it must be assumed that hunting pressure concentrated on either of the age groups was not preferential, or that any preference was compensated (protection of females with cubs was not in effect during the period considered). The fact that Eskimos often have little choice with regard to sex or age composition of their kill once the sled dogs have caught bear scent adds a little more credence to the calculation.

### Organization of Hunts

In some northern Canadian areas Eskimos have organized hunts particularly for polar bears and still do, although a great many hunts are highly fortuitous and take place during other operations, such as sealing. High trading prices for skins and desire to augment income from other sources when trapping is poor have occasionally resulted in organization of bear hunts. During 1953-54, organized hunts were reported from six northern settlements of 14 sampled. Most of the hunts were reported to have taken place during March and April; February, May, and October also being mentioned. Southamton Island and Pangnirtung were among the areas organizing hunts. Occasional hunts have also been organized on the Simpson Peninsula.

Only five of 17 areas (20 per cent) reporting on this situation in 1956-57 were recorded as organizing bear hunts. This percentage probably remains rather constant from year to year. Generally it seems that Eskimos in approximately 30 per cent of the coastal settlements of Northern Canada organize bear hunts, which mainly occur in March and April. No data are available regarding organization of hunts from 1957 to 1960.

### Kill Chronology

Of a sample of 161 polar bears killed in 1953-54 from 14 settlements in the Canadian Arctic, approximately 55 per cent were traded from April to June - over 25 per cent in June. Another peak period was October-November, when 20 per cent of the bears were traded. Considering that most hunts for bears

apparently take place in March and April, it seems fair to assume that perhaps a lag of a month or more exists between the time of the bear's death and the trading of its skin. If this is so (the writer has been informed of it by one trader)<sup>1</sup>, then about half of the white bear kill during 1953-54 in Northern Canada took place from March to May - with perhaps a fifth of the kill occurring in September and October. It should be realized that no fixed time exists for trading the pelt after the animal is killed; nevertheless the trend of the kill chronology (compared to that of 1956-57) seems to add reliability to the above conclusions.

During 1956-57 the time of polar bear kill rather than the time traded was specified on the questionnaires; thus no lag compensation need be considered. It is well to remember, however, that much of these data are probably based on an estimated time of kill. Of 408 polar bears reported on from 23 northern settlements, about one-third were killed during March - approximately 70 per cent of the kill falling between March and May. A minor winter peak resulted in December when about eight per cent of the sampled kill took place. In contrast to the Canadian situation, about 79 per cent of the native kill in Alaska<sup>2</sup> (according to tentative data for 1958-59) occurs from November to January, which is apparently the time when most bears drift inshore and come within range of Eskimo hunting. Foote<sup>3</sup> has stated another reason, "This growing belief, that the onset of aircraft activity (hunting) means the termination of Eskimo polar bear hunting, has forced some Point Hope men to take unnecessary risks to obtain a mid-winter kill...."

A comparison of the chronology of kills for 1953-54 (adjusted) and 1956-57 seasons (Fig. 2) shows no major discrepancies, except for the much greater number of bears taken in March of the latter period. A re-examination of the pertinent questionnaires yielded evidence that the high peak in March 1956-57 was due largely to the great number of females with cubs taken at the time of den emergence on Southampton Island. The 1953-54 graph would show a similar peak in March if total kill figures (62 adults and 33 cubs) were entered rather than only the skins traded (20). There is little doubt that the 1956-57 graph is the most reliable of the two presented, and shows characteristic features of polar bear kill intensity with respect to time.

If the foregoing data are generally valid over a number of years, it would seem that a closed season from the beginning of March to the end of May would be a most effective means of protecting polar bears in the Northwest Territories.

The impediments to establishment of a closed season will be mentioned later.

### Utilization

One of the most important factors of the polar bear take in the Canadian Arctic is its economic value to the Eskimos. Some indication of the actual necessity of bears to the Eskimos' way of life may be reflected in the following material. It must be remembered that the percentage utilization of pelts and meat is based on estimates of northern traders and Royal Canadian Mounted Police officers.

In 1953-54, 58 of 309 polar bear skins were kept by Eskimos from 14 northern settlements - retention averaging 19 per cent. Of the remaining bear skins about 51 per cent were traded at Hudson's Bay Company posts, while an estimated 30 per cent were sold independently by the Eskimos. No data are available on utilization of meat during the period. Very seldom are the bears killed for their meat alone and the skins not used.

The number of bear pelts retained by Eskimos for personal use during the 1956-57 period averaged about 15 per cent of the 331 pelts in the sample. At Resolute Bay, Pangnirtung, and Igloolik all skins taken were traded, presumably because of the high demand and prices offered at nearby air bases, and the tendency of Eskimos in such populated localities to replace bear skins, formerly used in their dress and dwellings, with material from southern markets.

It has been estimated that during the above period, 55 per cent of the total quantity of bear meat taken was consumed by Canadian Eskimos, the remainder being used for dog food. Apparently all of the meat taken at Igloolik, Tuktoyaktuk, and Lake Harbour was used for human consumption. It is notable that throughout most of the western Arctic the greatest percentage of bear meat is used for dog food - a possible result of the healthier economic state of that region. Generally, where the Eskimos are closely bound to the animal produce of their area, bear meat adds welcome variety to their diet.

During 1957-58, although only a few areas reported in this regard, native retention of hides approximated 15 per cent. Seventeen skins were kept from 113 in the sample. The following season (1958-59), Eskimos retained 26 of 85 skins in the sample, which resulted in a higher percentage utilized -

approximately 31 per cent. No data were recorded concerning utilization of bear meat or skins in 1959-60.

From available information perhaps 20 per cent of the skins taken by Eskimos in the Canadian Arctic are retained for personal use, the remainder being traded. Possibly 55 per cent of the total quantity of bear meat taken is consumed by the Eskimos, while the rest is used as dog food. These approximations seem to be valid for the 1950-1960 period at least, but there is no doubt that the percentage of bear meat and skins utilized by Eskimos was extremely high when the white man's influence was less in settled regions of Arctic Canada. Such utilization probably increased during the war period (1940-1946) when little external support could be given to the Eskimo economy.

#### Value of Skins

As might be expected, fur production values of bear skins from 1921 to 1959 (Fig. 1) follow rather closely the trend of the quantity of polar bear pelts exported (Table 2). A pre-war peak value of \$10,331 occurred in 1924, but dropped to only \$270 in the poorest year recorded, 1934. Following this a rather steady rise culminated in an unprecedented fur production value of \$33,075 in 1958 (Table 3).

From an economic point of view, polar bear skins are best considered luxury items. Both the graph of fur production values and the high prices received for good pelts support this assumption. The general decorative use of polar bear skins as rugs and wall hangings, where much less expensive materials would suffice, also points to their luxury nature from the consumer's viewpoint.

The price of a good polar bear skin has risen substantially since 1878 when Schwatka<sup>4</sup> mentioned that one was obtained off the southern tip of Baffin Island for a half plug of tobacco and a few charges of powder. According to Russell<sup>5</sup> in about 1894, natives in the Mackenzie region received from \$5.00 to \$15.00 in trade for prime skins. Since that time prices received by Eskimos for bear pelts have climbed steeply. Average fur prices for polar bear hides (based mainly on Dominion Bureau of Statistics figures) from 1944 to 1957 have been graphed (Fig. 3). An average price of \$40.00 for a large skin may be assumed for 1956, based on information from Frobisher Bay, Pond Inlet, Cape Christian, and Aklavik. The highest average price paid for a good bear skin was \$50.00, at Aklavik.

Prices probably averaged \$90.00 for very good bear pelts in 1958. At Tuktoyaktuk the price ranged as high as \$125.00. The following year, average prices were about the same. In 1960 a good bear skin was generally valued at \$125.00 in the western Arctic, while at Resolute Bay prices ranged from an estimated minimum of \$30.00 to a maximum of \$65.00. The greatest amount received for a pelt in 1960 seems to have been \$150.00 at Tuktoyaktuk. Normally, prices of good polar bear hides in the western Arctic are up to 20 per cent higher than those prevalent in the Canadian eastern Arctic. Summarily, prices of polar bear pelts have risen about 100 per cent over the past 60 years.

The monetary advantage of bear hides to the Eskimos for trading purposes must be acknowledged in view of the relatively high prices prevalent. This revenue is especially important in areas where most bears are taken, such as Southampton Island, Resolute Bay, Pangnirtung, and Clyde River. In these places native purchasing power must be augmented significantly by income from hides. It is thus necessary for the Government of Canada and the Canadian Eskimos to promote conservation of the polar bears, in the sense that they be used in the most efficient manner possible without endangering survival of the species.

A point of conflict appears to have arisen recently between trading company prices (based on economic demand) and government desire to preserve the polar bears at a safe population level. Values of bear hides are directly involved here, and it is well to quote opinions of officers of the Royal Canadian Mounted Police in order to outline the problem:

Pangnirtung Detachment, 1958 - "We, as Law Enforcement Officers, have been asked to stress conservation to the Eskimos and to enforce the Game Act to its fullest extent in regards to the illegal killing of bears. This has placed us in what may be deemed an undesirable position with the Natives, because as soon as we began to teach and advocate conservation of polar bears, the Hudson's Bay Company raised its Fur Tariff from the usual \$35.00 for a prime skin, to as high as \$90.00."

Spence Bay Detachment, 1958 - "The great increase in the price of bear skins has definitely made a difference to the local Eskimos. Two hunters from the settlement of Spence Bay went bear hunting on

the Western side of Boothia (James Ross Strait) and bagged six (6) between them. It was the enticing value of the bear skin that took them hunting and not the need or wish for meat...."7

Other reports have stressed that more time than usual is spent hunting polar bears due to high prices, and that special hunts may be organized on this account.<sup>8</sup> It has also been stated that some trappers supplement their income by hunting bears when other game is scarce.<sup>10</sup> Conversely, when trapping is good, polar bears apparently receive less attention from the Eskimos. It is important that the effect of pelt cost on the magnitude of the bear kill in Northern Canada be recognized, as this factor may be related to conservation measures mentioned below.

#### Legislation

In discussing data on the polar bear kill in Northern Canada, it seems advisable to take cognizance of some of the legal policies instituted by the Canadian Government in respect to the animals. In general, legal moves in this regard have stemmed from the idea that the bears should be maintained at a population level sufficient for optimum utilization by northern natives on a sustained yield basis. Until sufficient data have been made available to institute a more enlightened management program of this nature, there has been an effort to safeguard Canada's bear population in various ways. Only Eskimos, Indians, and the few holders of general hunting licences may legally harvest this wildlife resource. Polar bear hunting is forbidden to sportsmen in Manitoba, Ontario, and Quebec, as well as in the Northwest Territories. Existing legislation also prohibits the killing of females accompanied by cubs under one year of age, and forbids the taking of cubs under one year of age in the District of Keewatin and the District of Franklin (excepting Banks and Victoria Islands). This has been effected in order that the largest possible population increments may result from protection of the breeding potential. Trapping, a non-selective method of catching animals, could result in destruction of cubs, and females with cubs in contravention of the Northwest Territories Game Ordinance.

Although some attempts have been made to shorten the polar bear season in Canada, it seemed that this could not be readily achieved, as Section 3 of the Game Ordinance provides that seasons on "big game animals" (including polar bears) do not apply to Eskimos, Indians, or holders of general hunting

licences. However, an amendment to the Game Ordinance in September 1960 declares the polar bear a game animal in danger of becoming extinct, which means that bear hunting can be confined to certain seasons, geographical areas, sexes, or age classes when necessary. At present there seems to be no good reason for implementing a shortened season, despite its immediate feasibility. This will be discussed further.

Now, scientific licences to secure polar bears can only be issued to legitimate Canadian zoos which ensure adequate facilities for care of the animals.

Conservation education of northern natives to reinforce legislation concerning northern animals has been stressed for many years by officers of the Royal Canadian Mounted Police. According to game reports received, this method has proven at least partially effective in preventing needless killing of polar bears<sup>11,12</sup> and thus deserves full support. There appears to be no easy solution to the conflict, mentioned above, between stimulation of polar bear hunting based on economic motives of demand and trade profits on one hand, and government policy regarding bear conservation on the other. Perhaps only detailed investigation concerning factors influencing population size and some sound estimates of the size of the bear population in Canada will indicate whether this apparent conflict is a real problem. If trading revenue proved to be a major factor contributing to an excessive bear kill, legislation prohibiting or controlling the export of pelts would probably be the best primary conservation measure to enforce. By this means the take would be mainly restricted to those bears necessary for the welfare of Canada's Eskimo population. Perhaps this could be achieved when necessary by amendment of the Game Export Act.

#### International Problem

The importance of the international aspects of polar bear study are recognized by the Canadian Wildlife Service and efforts are made to co-operate and maintain contact with scientists in other countries who are particularly interested in the problem. International legislation concerning the polar bear has been summarized rather adequately by Scott et al.<sup>13</sup> More dubious is their estimate of the world population of these large carnivores.

Generally, as far as the international status of the bears is concerned, it seems that Canada and Alaska<sup>2</sup> have the "healthiest" populations. Spärck's<sup>14</sup> figures clearly indicate

a decline in polar bear stock, which is most pronounced on the west and southeast coasts of Greenland, while both Sdobnikov<sup>15</sup> and Uspenski<sup>16</sup> have stressed the great rarity of the white bear due to over-intensive hunting in the Soviet Union. Besides hunting destruction, Uspenski (op. cit.) seems to imply that other Arctic regions are involved in this decrease.

According to Gjelsvik<sup>17</sup> the Kong Karl's Land archipelago in Svalbard is the only complete sanctuary for bears in the Norwegian Arctic, although there have been discussions from time to time concerning wider protection of the animals there. The only information on polar bear numbers concerns records obtained from trappers wintering at Svalbard or spending the summer there. As these figures are unreliable in Gjelsvik's opinion, it seems that the status of bears in the Norwegian Arctic is doubtful.

In summary, there may be two near positive situations, two negative situations, another being doubtful. Although the relative poverty of bears in the Soviet and Danish Arctic regions may, in fact, be due solely to over-hunting, it is possible that other environmental and ecological conditions, such as climatic trends, concentration of pack ice, and degree of snowfall, may exert an unknown but powerful influence where such depletions are evident. It is the writer's impression that prey - mainly seals - is still as plentiful as usual in Arctic Russia and Greenland, but perhaps in southern Greenland the recent northern shift of warmer currents has had an adverse effect on the seal population. Such an alteration may have also destroyed pack ice conditions suitable for the existence of polar bears in that region.

### Conclusions

1. Some data have been collected on the polar bear kill and its utilization, based on information from 14 to 26 coastal settlements in the Canadian Arctic. It seems probable that a fair index of the number of bears taken in the region from 1921 to 1959 is represented by a graph of bear furs exported (Fig. 1). More particular and exact information has been provided for the 1953-54 and 1956-57 seasons, which involves total known annual kills, total estimated actual kills, sex and age data, chronology of kills, degree of bear hunts organized, and utilization of the polar bear resource. Legislation and some international aspects of the polar bear problem have been

discussed in an attempt to outline the trend of Canadian policy on bear conservation, while fitting the situation in this country into its proper international perspective.

2. During the period from 1921 to 1959, major peaks in the number of polar bear pelts exported arose in 1925 (391 skins) and in 1958 (525 skins). These peaks are separated by a trough especially pronounced from 1932 to 1937 - the low occurring in 1934 when only 18 pelts were exported from the Northwest Territories. From a cursory inspection it appears that there is a positive correlation between the state of the Canadian economy from 1921 to 1954, and both number of bear pelts exported and fur production values (Fig. 1). Possible reasons for the major characteristics of the graphs in Fig. 1 are mentioned. Probably the desire and effort of the Eskimos to hunt polar bears are essentially constant over a long period (being based on their own minimal requirements), but fluctuate with outside economic demand. It is extremely doubtful that the graph of furs exported (Fig. 1) indicates any oscillation in the total bear population, although it cannot be denied that some bear seasons are "better" than others - on a regional level at least.
3. The average yearly take of polar bear pelts in the Canadian Arctic from 1951 to 1960 was 439 (based on fur export returns). Allowing for 20 per cent retention of skins by Eskimo hunters of the probable total number taken, it is likely that the total actual kill averaged about 549 bears per year. In the five seasons 1956-1960, the total actual polar bear kill possibly averaged 563 animals yearly. Possibly a reasonable estimate of the annual kill in the provinces is 34 bears. During the same period, according to the greatest known kills reported from settlements in Northern Canada (ascertaining yearly averages), the following areas seem to be most productive: Southamton Island (66), Resolute Bay (49), Pangnirtung (43), Clyde River (Cane Christian) (42), Spence Bay (36), Arctic Bay

(36), Frobisher Bay (32), Sachs Harbour (28). Similarly, the marginal areas of white bear range may be indicated: Grise Fiord (Craig Harbour) (14), Cambridge Bay (12), Ontario north coast (12)<sup>18</sup>, Alexandra Fiord (6), Cape Dorset (4), Coppermine (2), Chesterfield Inlet (1) (Fig. 4). Very approximately it may be stated that the greatest concentration of polar bears in Canada exists in eastern Franklin District.<sup>19</sup> A quadrangle (63°N.-75°N. and 60°W.-95°W.) encloses the most productive polar bear areas as far as is known.

It is perhaps significant that the relatively productive zones mentioned often have northeast-facing coasts, against which impinge surface currents of moderate velocity.<sup>20</sup> Such currents, assisted periodically by onshore winds, would tend to carry ice-raftered bears near land at these points. Depending upon seasonal ice conditions and suitability of topography, among other factors, segments of the areas mentioned apparently become denning concentrations (e.g. Porsild Highlands of Southampton Island, Simpson Peninsula east of Spence Bay). The most apparent reason for the general sparsity of polar bears between Coppermine and Cambridge Bay (Coronation Gulf, Melville Sound, and Dease Strait) is the prolonged and characteristically solid ice cover which occurs there. The environment is poor for both seals and bears. However, slightly farther east, near Perry River on Queen Maud Gulf, Gavin<sup>21</sup> observed that polar bears were fairly common in years when large floes drifted in from the north, but rare or entirely absent when the "big ice" did not come in. Although it seems that the northern coast of Ontario is beyond the range of optimum ice conditions for polar bears, it provides a greater average yearly take than Chesterfield Inlet. This may be largely due to the fact that the latter vicinity lacks the "bear-catching", northeasterly trending coast of Ontario, which also provides suitable denning conditions for female bears.

Grise Fiord (Craig Harbour) and Alexandra Fiord are both near the northern margins of important polar bear range. The Lincoln Sea to Kane Basin, source area for drifting ice near Alexandra Fiord, seems quite arid as a polar bear habitat. Perhaps the relatively strong currents from the north tend to check significant movement in this direction from the zones of bear density to the south. But it should be kept in mind that polar bear movements are not entirely involuntary and that regional abundance of prey is an extremely important consideration.

4. From the little evidence available it appears that the sex ratio of polar bears in the Canadian Arctic is approximately 100 males:100 females, providing Eskimos showed no sex preference in their hunting during the periods considered (but see page 7). This is in striking contrast to the great preponderance of males in the Alaskan kill (435 males:100 females, including sexed adults and cubs, 1958-59).<sup>2</sup> The difference is probably basically due to the fact that about 75 per cent of the Alaskan kill is accounted for by trophy hunters - there being a tendency to select large males where possible. Besides this, the Alaskan coast seems to be poor in denning areas compared to the Southampton Island and Simpson Peninsula districts which contribute substantially to the number of females in the Canadian kill. Perhaps cubs (up to 2 years) comprise some 20 per cent of the total bear population in Northern Canada.
5. Generally, it seems that Eskimos in about 30 per cent of the inhabited coastal areas of the Canadian Arctic organize polar bear hunts.
6. The greatest part of the Canadian white bear kill occurs between February and June, there being a minor peak in late autumn or early winter. According to the best evidence available, perhaps 70 per cent of the total annual kill falls between March and May. A closed season during this period could be an effective means of protecting bears in the Northwest Territories.

7. On the average, probably 20 per cent of the skins of polar bears taken by Canadian Eskimos are retained for personal use, the remainder being traded. Trade is greatly facilitated by the relatively large number of personnel earning high wages who have taken up temporary residence in Arctic Canada following the close of the Second World War, and the nearness of air bases to many of the Eskimo settlements where bears are hunted. Perhaps 55 per cent of the total quantity of bear meat taken is consumed by Eskimos, the remainder being used for dog food. Throughout most of the western Arctic the greatest percentage of bear meat is used for dog food, a possible result of the healthier economic state of that region compared to the eastern Arctic. Percentage utilization of bear meat and skins by Eskimos was undoubtedly much higher before the white man's influence was significantly felt in settled regions of the Canadian Arctic.
8. Values accruing from sale of polar bear skins reached a peak value of \$19,331 in 1924, dropping to only \$270 in 1934. Following the depression of the 1930's, a rather steady rise in fur values culminated in a peak of \$33,075 in 1958. Loughrey's view<sup>22</sup> that these values are rather insignificant compared to cash values for caribou taken in the Northwest Territories seems very sound. Nevertheless, income from the hides at the local or individual level can be of great importance, for instance during poor trapping periods.

With regard to payments received by Canadian Eskimos for prime pelts, they have varied from \$5.00 to \$15.00 in 1894, to as high as \$125.00 in 1958. Generally, polar bear skins have been somewhat more expensive in the western Arctic than the eastern Arctic. Native purchasing power must be augmented significantly in some areas by revenue from bear hides. Fair evidence exists that higher prices offered for pelts by traders and private individuals sometimes stimulate Eskimos to organize hunts particularly for bears, and

spend longer periods hunting bears. High fur prices occasionally bring extraneous, uneconomical killing of the large carnivores. Such monetary stimuli may be acting against sound conservation principles, but more detailed research on the polar bear population of Northern Canada is required before this may be ascertained.

9. In general, legislative policy in Canada concerning polar bears has stemmed from the desire to maintain the animals at a population level sufficient for optimum utilization by northern natives on a sustained yield basis. Until adequate data have been made available to institute a more enlightened management program to this end, there has been an effort to safeguard Canada's bear population by allowing only northern natives to harvest the resource and by prohibiting the killing of females with cubs (see page 13). Scientific licences to secure polar bears are issued with great care, only after thorough investigation of applications.
10. The international aspects of polar bear study are very important - the animal being Holarctic in range. As far as the world status of the white bear is concerned, it appears that two near positive situations exist in Canada and Alaska, two negative situations prevail in Greenland and Northern Russia, while the status of bears in the Norwegian Arctic is too poorly known to make any statement, albeit tentative. Although the relative poverty of bears in the Soviet Arctic and Greenland regions may be entirely due to excessive hunting, possibly environmental and ecological conditions exert an unknown but powerful influence where such depletions occur. It does not seem wise to consider decimation of bear numbers in the two regions mentioned as being only due to population shifts. Canada must be continually vigilant of the trends in her white bear population as numbers in adjacent territory of Greenland have waned dangerously. Credit is due to officers of the Royal Canadian

Mounted Police who have kept a conscientious watch on the bear situation in southeastern Ellesmere Island, where the survival of the animals was possibly endangered by over-hunting of neighbouring Greenlanders.<sup>23</sup> Full co-operation of the Greenland authorities was given in this case.

It appears desirable that research on polar bears be undertaken co-operatively by the nations concerned, primary efforts being directed toward discovering the distance, directions, and densities in which the animals generally move, and, secondarily, study of ecological and biological factors governing bear numbers and distribution.

## Aids To Further Study

It is very important that the Canadian Wildlife Service receive explicit data on the annual polar bear kill in the Northwest Territories. Royal Canadian Mounted Police reports and, in some cases, Hudson's Bay Company data, have proven extremely valuable, despite variations in depth and coverage. In some cases conflicts have occurred between certain reporting sources (Table 4).

Desired field information might be obtained in more standardized fashion by annual distribution and collection of a concise form containing the most important questions on game (including polar bears) in order of importance. Such a form could be completed by Northern Service Officers in co-operation with Royal Canadian Mounted Police representatives and trading post managers where possible, and otherwise by any one of the above persons. Such question forms should be distributed with maximum coverage and minimum overlap.

Perhaps in the future the Canadian Wildlife Service may be able to provide greater aid to policy and planning agencies by hiring certain qualified Eskimos as field data reporters and assistants. These men would be responsible for supplying explicit information on regional game takes, besides assisting officers of the Service in field work where necessary.

In order to assess trends in the character of the Canadian polar bear kill and related subjects, it seems advisable that annual reports, summarizing the most important information collected, should be integrated and re-analyzed every five years. It is suggested that these reports be sent to persons who have contributed to collection of the raw data.

Generally, it appears that no single nation among the countries concerned is well able to secure the necessary information relating to polar bear movements and ecological factors governing their numbers and distribution. As measures for effective management of the species cannot be firmly recommended without this knowledge, it seems that mutually agreeable, co-operative approaches should be discussed internationally.

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TABLE 1  
Polar Bear Data, N.W.T. 1953-54 to 1959-60.  
Sex and Age Composition of Kill

Season	Reporting Areas	Sexed Adults			Sexed Cubs			Age Ratio Cubs:Adults	Sex Ratio Male:Female	Percentage Cubs
		Male	Female	Total	Male	Female	Total			
1953-54	14	36	42	78	-	-	-	19:112	86:100	15
1956-57	23	93	98	191	40	34	74	117:291	100:100	28
1957-58	24	39	50	89	-	-	-	14:70	78:100	17
1958-59	25	93	63	156	-	-	-	12:86	148:100	12
1959-60	26	41	41	82	-	-	-	-	100:100	-
Average									102:100	18

TABLE 2

Number of Polar Bear Pelts Exported from the Northwest Territories 1921-1960 (Year ending June 30).

Figures in brackets from Fur Export Tax Records as opposed to Game Take Records.

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<u>Year</u>	<u>No. of Pelts</u>	<u>Year</u>	<u>No. of Pelts</u>
1921	208	1942	71
1922	341	1943	61 (125)
1923	258	1944	84 (137)
1924	344	1945	62 (182)
1925	391	1946	193
1926	325	1947	141
1927	202	1948	227
1928	372	1949	410
1929	287	1950	277
1930	308	1951	357
1931	248	1952	406
1932	118	1953	433
1933	63	1954	437
1934	18	1955	507
1935	39	1956	420
1936	44	1957	416
1937	46	1958	525
1938	140	1959	382
1939	109	1960	509
1940	148		
1941	101		

TABLE 3

Fur Value in Dollars of Polar Bear Pelts Exported from  
the Northwest Territories 1921-1959 (Year ending June 30).

<u>Year</u>	<u>Fur Value</u>	<u>Year</u>	<u>Fur Value</u>
1921	5,249	1941	505
1922	6,142	1942	355
1923	5,269	1943	305
1924	10,331	1944	2,100
1925	9,435	1945	1,550
1926	3,262	1946	2,825
1927	3,691	1947	3,525
1928	7,125	1948	5,675
1929	5,792	1949	12,300
1930	4,250	1950	6,925
1931	1,823	1951	8,925
1932	550	1952	8,120
1933	718	1953	8,660
1934	270	1954	10,000
1935	512	1955	14,196
1936	577	1956	10,500
1937	598	1957	10,400
1938	1,820	1958	33,075
1939	1,526	1959	26,740
1940	2,072		

TABLE 4

Polar Bear Data, N.W.T. 1949-50 to 1959-60.  
 Fur Take (Fur Export Records): Highest Take (R.C.M. Police or Hudson's Bay Co.).

Area	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Aklavik	21	16	18:1	10	23	-	1	2	3:24	2:23	1:8
Holman Island	-	-	-	0	14:12	9	2:11	17	25	13	29:19
Coppermine	-	-	3	2	1:0	1	3	1	1	0	3
Cambridge Bay	24	5	22	30	-	26	9	9	4:1	19:19	8:20
Igloodik	0:0	3	3	18	21	16	6	28:10	23:12	4:10	18:5
Chesterfield Inlet	5	6:0	3	5	3	3	-	-	1	-:2	-
Arctic Bay	26	19	4	25	10:20	25	22	49:36	27:24	11:42	35:40
Clyde River	-	16	17	32	42	22	33:52	19	21:26	51:40	62:40
Frobisher Bay	25:32	24	55	38	22	37	16	18	61	22	45
Cape Dorset	-	-:6	6	4	-	-	3	1	12	3:10	2

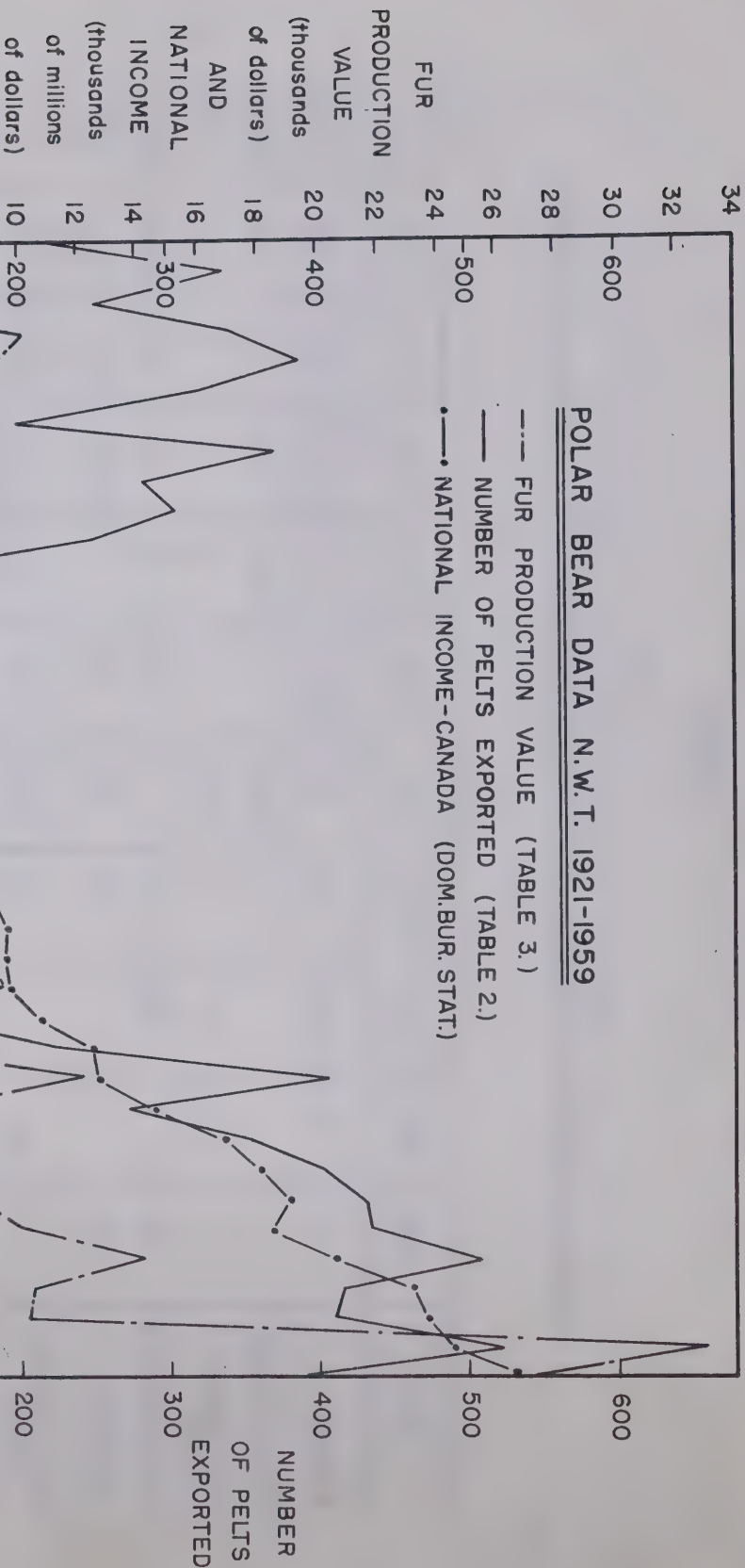


FIG. 1.

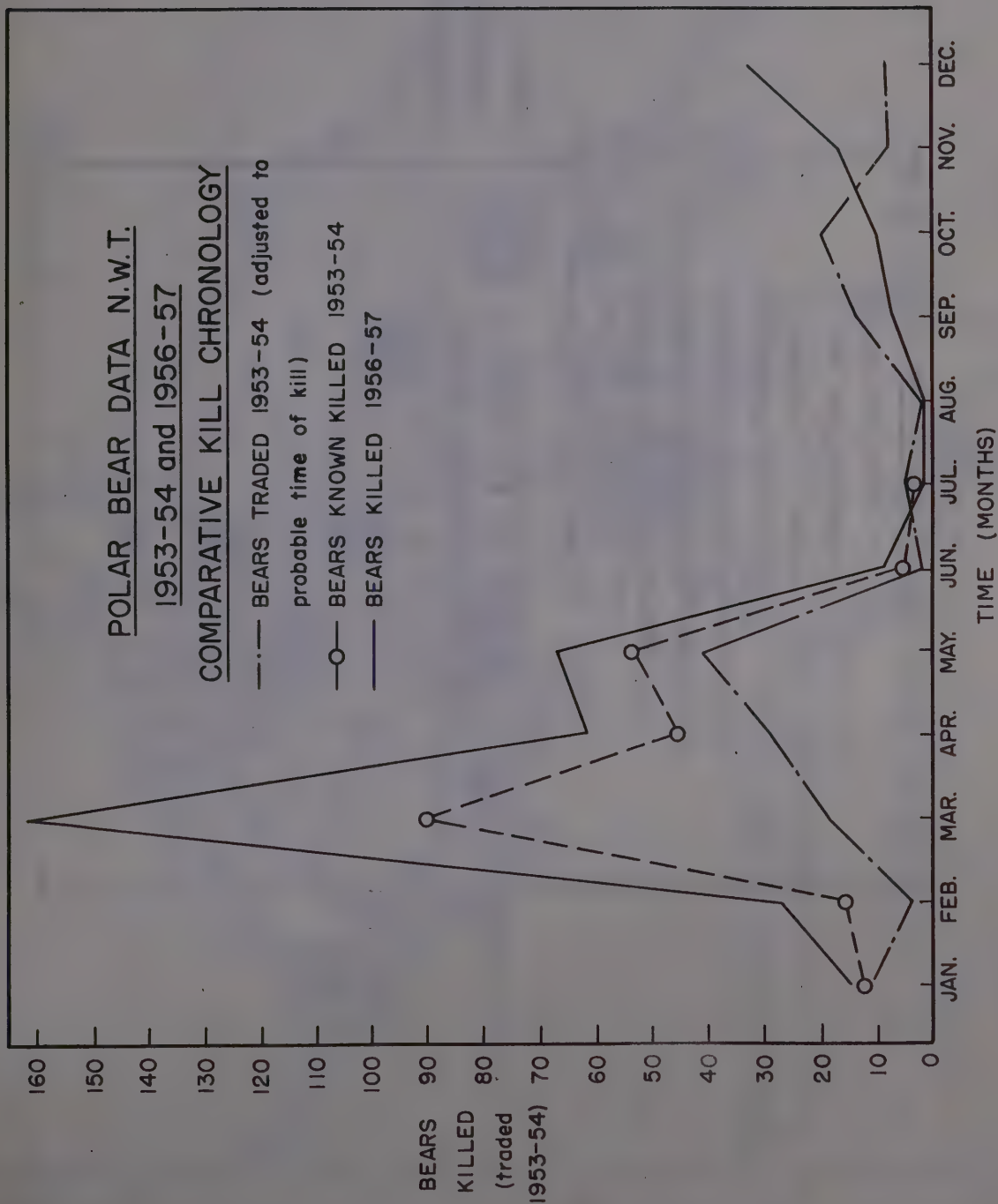


FIG. 2.

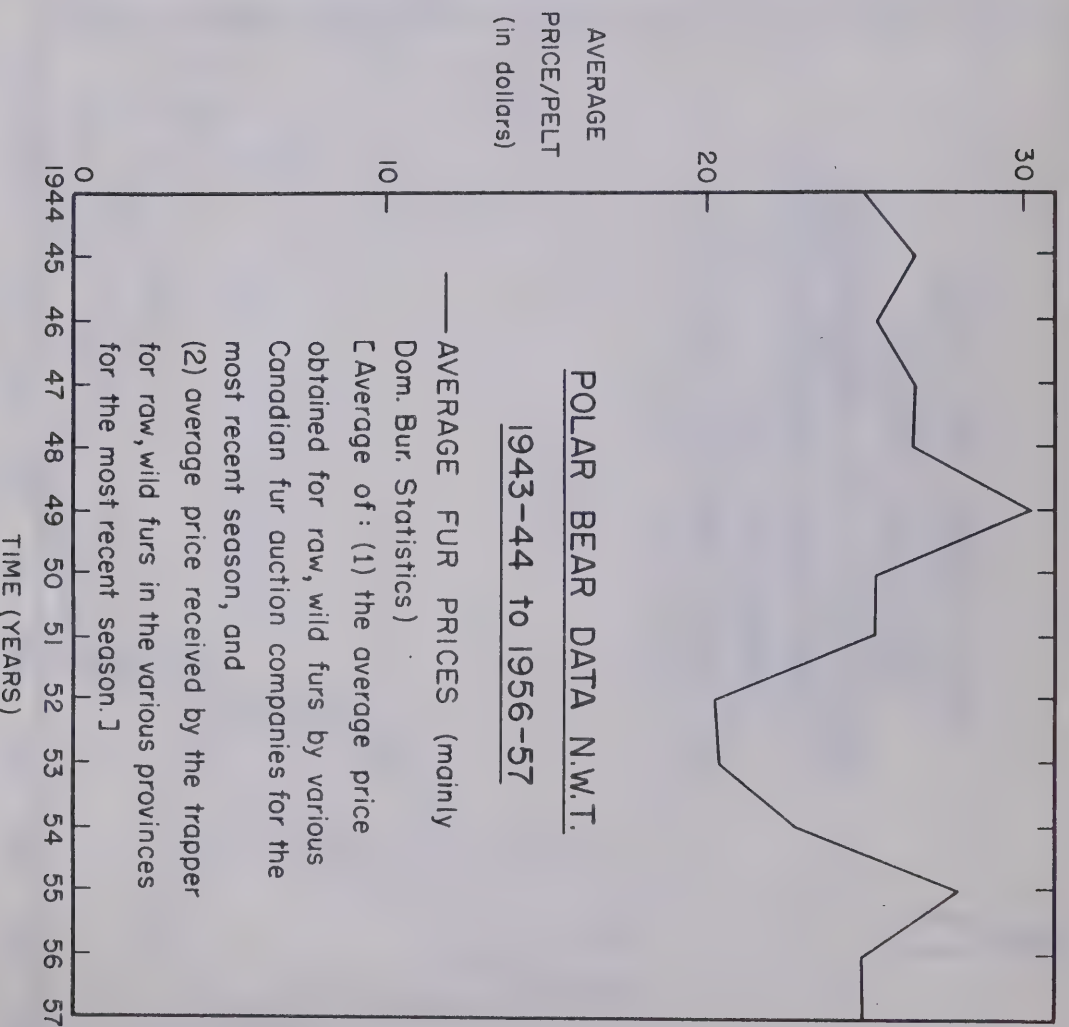
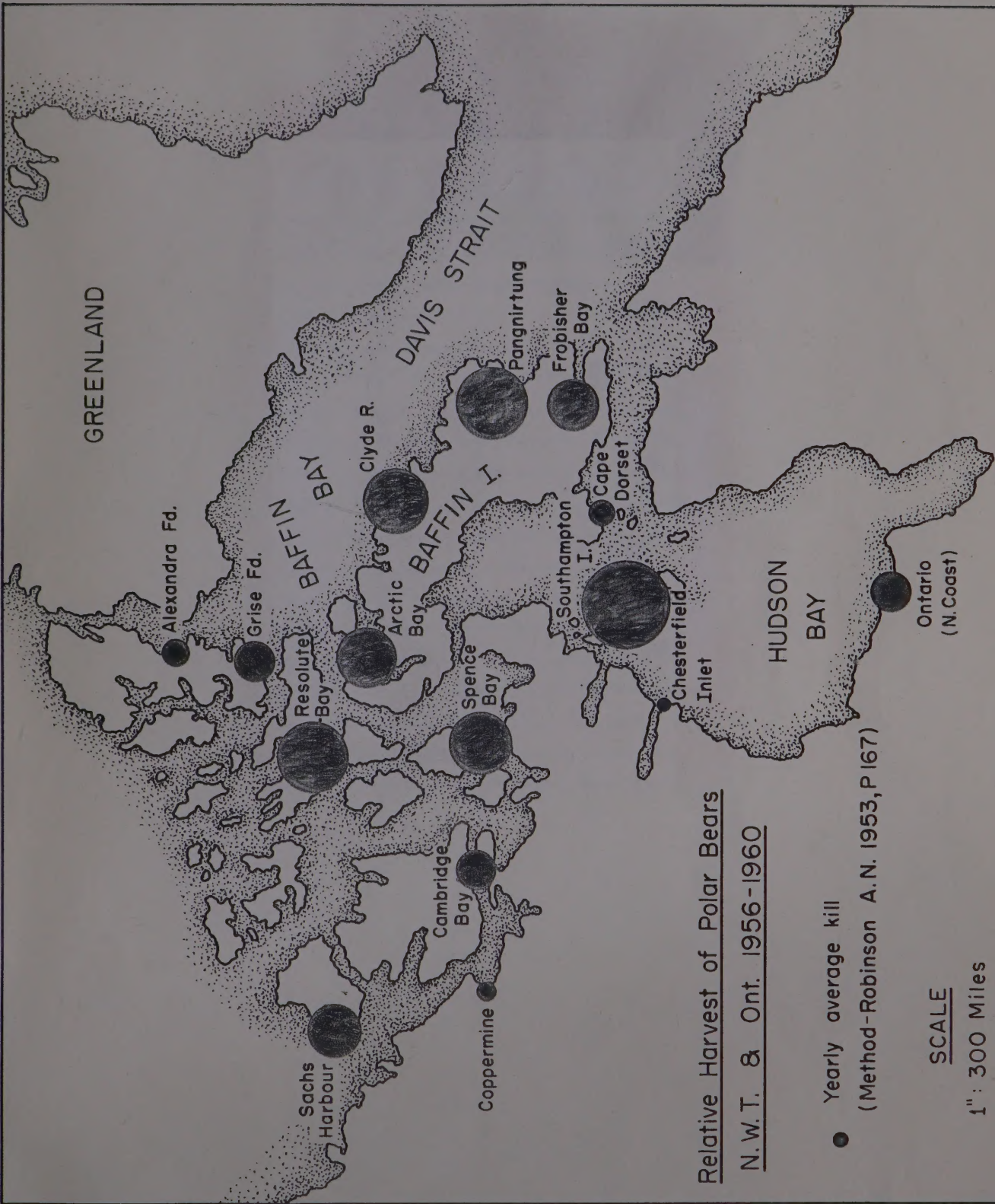


FIG. 3.



[illegible]

DEC 12 '72

FEB 26 '74

OCT 10 75

NOV 12 '75

DEC 10 '76

SEP 29 '77

OCT 7 1977

OCT 14 77

OCT 21 '92

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